

What is claimed is:

1. A mold for encapsulating and underfilling an integrated circuit chip assembly including an integrated circuit chip mounted on a substrate in a standoff relationship, said mold comprising:

5 a first mold portion having first and second cavities and a channel interconnecting said first and second cavities, said first cavity being adapted for enclosing said integrated circuit chip on said substrate;

a second mold portion;

10 said first and second mold portions being adapted to clamp the substrate between the first and second portions with the integrated circuit chip located within said first cavity;

a vent for exhausting air from said first cavity; and

15 injecting structure for injecting encapsulant into said first cavity of said first mold portion at two spaced locations in said first portion remote from the point of connection of said channel to said first cavity generally in the direction toward said channel, such that encapsulant flows around and underneath said integrated circuit chip and through said channel into said second cavity to thereby underfill and encapsulate said integrated circuit assembly.

20 2. A mold for encapsulating and underfilling an integrated circuit chip assembly according to claim 1 wherein said injecting structure includes first and second

inlet gates such that said first inlet gate is located over said integrated circuit chip and said second inlet gate is located beside said integrated circuit chip.

3. A mold for encapsulating and underfilling an integrated circuit chip
5 assembly according to claim 1 wherein said first and second mold portions are upper and lower mold portions respectively.

4. A mold for encapsulating and underfilling an integrated circuit chip
assembly according to claim 1 wherein said injecting structure also causes encapsulant to
10 flow over said integrated circuit chip.

5. A mold for encapsulating and underfilling an integrated circuit chip
assembly according to claim 1 wherein said vent also is adapted for exhausting air from
said second cavity.

15 6. Apparatus for encapsulating and underfilling an integrated circuit chip
assembly including an integrated circuit chip mounted on a substrate in a standoff
relationship, said apparatus comprising:

a mold having a first portion and a second portion;

20 said first portion having first and second cavities and at least one channel
interconnecting said first and second cavities;

said first cavity being adapted to enclose said integrated circuit chip on said substrate;

a vent for exhausting air from said first cavity; and

injecting structure for injecting encapsulant into said first cavity of said first
5 portion at two spaced locations in said first portion remote from the point of connection
of said at least one channel to said first cavity generally in the direction toward said at
least one channel, such that encapsulant flows around and underneath the integrated
circuit chip and through at least one channel into said second cavity to thereby underfill
and encapsulate said integrated circuit assembly.

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7. Apparatus according to claim 6 in which said first and second portions of
the mold are upper and lower portions, respectively, of said mold.

8. Apparatus according to claim 6 wherein said vent is also adapted for
15 exhausting air from said second cavity.

9. Apparatus according to claim 6 wherein said injecting structure for
injecting encapsulant into said first cavity includes first and second inlet gates wherein
said first inlet gate is located over said integrated circuit chip and said second inlet gate is
20 located beside said integrated circuit chip.

10. An integrated circuit package comprising.

an integrated circuit chip mounted on a top surface of a substrate in a standoff relationship;

an encapsulant body adhering to the top surface of the substrate, encapsulating the chip and filling the standoff space between the chip and substrate; and

5 at least one elongated encapsulant channel adhering to the top surface of the substrate and extending outwardly from the encapsulated chip.

11. An integrated circuit package according to claim 10 wherein said at least one elongated encapsulant channel extends outwardly from the encapsulated chip to a
10 secondary encapsulated body on the substrate.

12. An integrated circuit package according to claim 10 wherein said encapsulant body is an overmolded encapsulant body.

13. The invention as defined in claim 1, wherein one of said locations for
15 injecting encapsulant being in the vicinity of the top of the integrated circuit chip, and the other location being in the vicinity of the space between the integrated circuit chip and the substrate, such that encapsulant flows around and underneath the integrated circuit chip and through the channel into said second cavity to thereby underfill and encapsulate
20 said integrated circuit assembly.

14. The invention according to claim 1 wherein said integrated circuit chip is a flip chip having contacts on one side thereof interconnected with contacts on one side of said substrate by solder balls.

5 15. The invention according to claim 6 wherein said integrated circuit chip is a flip chip having contacts on one side thereof interconnected with contacts on one side of said substrate by solder balls.

10 16. The invention according to claim 1 including a vacuum device positioned to draw air from within said first and second cavities.

17. The invention according to claim 6 including a vacuum device positioned to draw air from within said first and second cavities